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Specification as originally filed, with Application for Patent Serial No: **2,408,979**, on
October 18, 2002, by **RICHARD EGON SCHAUBLE**, for "Tamper-Evident Use-
Indicating Odometer and Engine-Timer".

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ABSTRACT

The present invention relates generally to the provision in an automobile of a tamper-evident combined Odometer and Engine Run-time recorder, optionally with display of average speed or indication of type of vehicle use.

TAMPER-EVIDENT USE-INDICATING ODOMETER AND ENGINE-TIMER

FIELD OF THE INVENTION

This invention relates generally to the field of instrumentation and measurement, and display of useful historical operating information in automobiles and similar vehicles, and the provision of such information in a simple, cost-effective, reliable and trustworthy way to end-users and others.

BACKGROUND OF THE INVENTION

It is well-known in consumer automobiles to provide tamper-evident odometers which display a recording of total vehicle mileage since odometer replacement, thus giving the vehicle's owner or subsequent purchaser some idea of the mileage on the vehicle and thus of wear and expected remaining life-span in very broad terms of the vehicle's main components, and thereby assist in the timing of maintenance procedures and the rough value of the vehicle based upon its prior use. Modern odometers are provided which have rolling cylinders with numbers printed thereupon which align themselves properly in normal use, but misalign when tampered with by, for example, being "rolled back" to falsify the apparent mileage on the vehicle.

It is also well-known in industrial equipment and aircraft, for example, to provide what is commonly referred to as a "Hobbs Meter", which in some manner measures and records engine run-time on a cumulative basis. This is useful in the case of some equipment in calculating charges for use on a "per-hour" of actual use basis, and to measure the time between mandatory service of aircraft in a highly safety-regulated setting, as in modern passenger aircraft.

In modern aircraft, given mandatory service cycles which are measured by elapsed engine-use time, the approximate value of the aircraft may be seriously affected by the time-remaining until major service or parts replacement, the cost of which is typically amortized over the expected time between service.

In US 5,970,436 Berg ('436) is described a system of detecting and reporting equipment utilization for the purpose of reporting information on "use hours" by correlating a timer with a motion sensor to record "time in motion". The aim of Berg's '436 patent is to differentiate between idle engine hours and engine hours with equipment

in motion in order to better schedule maintenance and to better charge for utilization of heavy equipment in the materials handling realm such as large scrapers, tractors, earthmovers and the like. The method and equipment provided is complex, and while perhaps affordable for the measurement of heavy industrial equipment, is too expensive and complex for a consumer-targetted automotive application of mass distribution, for example.

In US 5,862,500 Goodwin ('500) is described a trip data recorder and data manipulation system using electronic pulses generated and measured from the drive-train of the vehicle which also records date, start time, distance traveled, and stop time of a vehicle during a particular trip. While useful for some settings, the capture of this type of data and its manipulation for particular trips does not provide information about the overall use of the vehicle over its entire life, and thus approaches a different problem.

In US 5,857,159 Dickrell et al ('159) is described a complex system of recording a variety of vehicle operating information and characteristics, storing that information, and then displaying the information in meaningful ways. The system is comprehensive, complex, and requires large storage and competent computational power on-board. '159 may be useful for some vehicle management and maintenance systems requirements, but it is too complex and requires more computation and storage, as well as remote sensing and data-gathering sub-systems than would be required for a simple system of mass adoption in consumer automotive settings.

In US 5,819,201 DeGraaf ('201) is described a navigation system which measures routes, distance traveled, trip information and whatnot, as well as service intervals calculated from trip information, and then provides reminders and directions using navigation subsystems to nearest service facilities. While useful, this invention attacks a different problem than the instant applicant's invention, and gives no indication of overall vehicle condition.

In US 5,074,144 Kofchalk et al ('144) is described a system of recording and displaying operating performance of a vehicle over time, including measurements of manifold pressure, vehicle speed, engine operating speed and trip-over events when any of those things is sensed to be outside of a pre-set operating range. Total operating time and total idle time is also displayed to the operator in real-time. The aim of '144 is to measure the performance of a vehicle and its components (engine) while at the same time

measuring the performance of its operator, in order to optimize driver performance and protect vehicles from use by operators outside of the vehicle's intended operating parameters, thus attempting to avoid uses which would damage the vehicle or cause inordinate amounts of wear and thus higher maintenance and fuel-use costs. The aim and method of attacking the aim are quite different from the purpose of the applicant's invention.

In US 4,593,263 Peckworth ('263) is provided a mileage recording and service reminding accessory for a shared-use vehicle in order to ease the accounting burden and gather evidence useful for management of the share-use vehicle amongst its various users and uses in order to appropriately allocate costs. As such, the instrument attacks a different purpose, and gathers different information than that of the applicant's invention.

In US 4,501,005 Miller ('005) is disclosed an elapsed mileage indicator, which indicates vehicle maintenance reminders at pre-selected elapsed mileages traveled by the vehicle, using engine ignition pulses as its input, thus measuring engine usage times and approximating mileage by computation therefrom. While the invention is interesting and undoubtedly useful, it again attacks a different problem from that solved by the applicant's invention.

It is, therefore, desirable to provide a system which overcomes the failings of the inventions cited above, and over the prior art by providing a tamper-evident measurement or set of measurements which taken together can give some relatively useful information about both overall vehicle use and some indication of type of use, in a simple, consumer-oriented, mass-market automotive setting.

SUMMARY OF THE INVENTION

It is an object of the present invention to obviate or mitigate at least one disadvantage of prior art and to provide a tamper-evident display to the vehicle's user of a reliable measurement of historical gross vehicle mileage (distance traveled), historical gross engine "on" time (time running), and optionally, an indication of type of use by reference to a calculated average lifetime vehicle speed under power (distance traveled divided by engine time running) to indicate roughly how the vehicle might have been used.

In a first aspect, the present invention provides a tamper-evident readout of overall distance traveled (odometer reading).

In a further embodiment, there is provided in addition a tamper-evident readout of overall engine time running (Hobbs meter reading).

In further aspect, the present invention provides an indicator of the type of use of the vehicle over its lifetime, by inference from a calculated average lifetime vehicle speed under power (distance traveled divided by engine time running).

Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

None

DETAILED DESCRIPTION

Generally, the present invention provides a method and system to provide to a vehicle's user a reliable measurement of historical gross vehicle mileage (distance traveled), historical gross engine "on" time (time running), and optionally, an indication of type of use by reference to a calculated average lifetime vehicle speed under power (distance traveled divided by engine time running) to indicate roughly how the vehicle might have been used.

The system can be provided in an instrument which is added after manufacture, or during manufacture, of a vehicle.

The system uses information generally collected by currently mandatory vehicle standards (tamper-evident mileage measurement and display) and easily gathered and stored operating information (engine running time, which can be inferred from existing tachometer readings over zero, for instance, or from things like the ignition system's status, which is measured in modern vehicles for other purposes; the distance traveled, and the time that an inference that the engine is running can be made and can be counted using trite and well-known, robust, low-power clock, memory, and storage systems). Displays can be programmed into existing digital dashboard displays or provided by

adding no more than 3 simple displays (time, distance, average speed). It may be useful to provide a further method of measuring utilization on a trip-by-trip basis.

The information provided need not be sophisticated nor complicated, but must be tamper-evident and perhaps tamper-resistant systems would be preferred to enhance system and information trustworthiness for the user.

The benefit derived by a user is that there is some reliable and trustworthy, simple to understand and read, information from which inferences may be made about an equipped vehicle's historical prior use.

The average speed information could be constantly calculated and displayed, but the applicant envisions as a preferred embodiment a single digital display with a switch or button which toggles the display between readings of distance, engine running time in hours, and calculated average distance per hour of running time, with some indicator to tell the user the units of measurement being displayed. There might, but not necessarily, be a further indication of whether the average distance per hour of engine time indicates a particular type of overall vehicle use pattern to date (such as "high speed" or "very low speed" or "mainly idle" or "mainly highway", based upon statistical norms of such use compared to the calculated value for the particular vehicle at that particular time. The display would also be tamper-resistant and preferably tamper-evident. The digital nature of the display could be by electronics such as LED or similar types of display, or rolling dials with numerical values imprinted, or otherwise.